Turning slash piles into soil benefit

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Open burning of wood refuse in forestry releases smoke. Credit: UW

Your next bite of an organically grown apple may hold within it a tiny bit of a Washington forest.

Students at the University of Washington have teamed up on a startup that promises to turn slash piles of forest refuse into biochar, a crumbly charcoal-like product for farmers that helps their soil hold water and nutrients. Biochar is not technically a fertilizer, but often improves yield for farmers.

"Wine growers, organic farmers and gardeners of all sorts are part of the market we are targeting," said Jenny Knoth, a doctoral student in forest resources in the UW College of the Environment. The National Science Foundation chose the project, and Knoth as key student leader, for their Innovation Corp announced Oct. 6.

After a stand of trees is harvested, the stumps and other woody debris not useful for the sawmill are collected into what are called "slash" piles, and typically burned in place because hauling the tons of material is not practical. It takes money and staff to burn the piles, and the burning produces more smoke than the new method designed by Knoth and her collaborators.

"This new product helps us manage an expensive problem," explained principal investigator Dan Schwartz, chair and Boeing-Sutter professor of the department of chemical engineering and adjunct professor of materials science and engineering. Landowners are required to clear slash before a timber sale can close. "It is a radically simple and low cost way to turn slash piles into a source of jobs and income," Schwartz said.

Knoth, with other team members, developed the new low-technology solution called the C6 Systems blanket, which covers and accelerates the pile's gradual conversion into char. The blanket is designed to limit the oxygen flow to the burning pile. Lowering the oxygen getting into the pile changes the chemistry from combustion to pyrolysis. Pyrolysis describes organic material burning with low oxygen into a char.

The process can take one day for a small pile or longer for larger piles. Slash on U.S. Forest Service and tribal lands has been offered as pilot study locations.

The biochar is estimated to sell for $1,500 per ton as a soil amendment to ecologically conscious gardeners and landscapers as well as organic farmers, Schwartz said. "This could transform what is a big problem and money sink into a money-making and job-producing engine for landowners, while helping to improve soil conditions and reduce smoke."

NSF chose this project as one of 21 nationally for a $50,000 grant to help boost the team of five students who have worked for months to

develop a business plan. The project links people across the UW campus from forestry, chemical engineering and the Center for Innovation and Entrepreneurship. Within six months, the NSF hopes the startup will prove itself ready to grow to higher commercial level.

"If we keep science in our labs, we are only doing half the work," Knoth said. She hopes to see the team's company, C6 Systems, become a viable commercial seller of biochar. Knoth grew up around people in the forest industry and says: "I grew up talking board feet at the dinner table."

Another key mentor for the project was Jeffry Canin, a former entrepreneur in residence at the Center for Commercialization at the UW. He has worked with several bioenergy and energy projects as they seek to transition technology from the bench to the marketplace.

This latest project follows earlier work by Schwartz. He leads the NSF-funded Bioresource-based Energy for Sustainable Societies program at the UW. The bioenergy program brings forest resource and engineering students in to the field to solve problems that real land managers face. His students have founded or co-founded five technology companies, all of which continue to operate.

Besides Knoth, Canin and Schwartz other team members of C6 include Kenneth Faires, Derek Churchill, Nate Dorin and John Tovey, III.

Provided by University of Washington